

CLAIMS

1. An integrated heat exchange and fluid control device comprising:
 - an inlet section configured to permit entry of a first fluid into said integrated heat exchange and fluid control device, said inlet section including an inlet body and a rotatable element rotationally received in said inlet body; said inlet body including a first port and a second port and said rotatable element including a first opening and a second opening;
 - a core having a heat exchange section and a bypass section; said heat exchange section being in fluid communication with said first port and configured to receive the first fluid and to permit substantial heat exchange between said first fluid located in said heat exchange section and a second fluid, said heat exchange section including a plurality of substantially parallel heat exchange conduits through which the first fluid flows;
 - said bypass section being in fluid communication with said second port and configured to receive the first fluid and to substantially prevent heat exchange between the first fluid located in said bypass section and the second fluid, said bypass section including at least one bypass conduit located proximal to and substantially parallel with said heat exchange conduits; and
 - an outlet tank coupled to both said heat exchange conduits and said bypass conduit configured to receive the first fluid therefrom and configured to discharge the first fluid from the integrated heat exchange and fluid control device;
- wherein said first and second ports and openings are positioned relative to one another and cooperate to create a first variable opening between said first port and said first opening and a second variable opening between said second port and

said second opening upon rotation of said rotatable element relative to said inlet body.

2. The integrated heat exchange and fluid control device of claim 1, further comprising a third port defined in said inlet body and a third opening defining in said rotatable element, said third port and opening cooperating to define a third variable opening.

3. The integrated heat exchange and fluid control device of claim 2, said third variable opening being in fluid communication with an air heating system.

4. The integrated heat exchange and fluid control device of claim 1 further comprising a control mechanism including:

a sensor measuring engine temperature; and
a response mechanism configured to rotate said rotatable element and adjust said variable openings in response to the engine temperature.

5. The integrated heat exchange and fluid control device of claim 4, further comprising a failsafe mechanism coupled to said rotatable element and, in response to at least partial failure of said control mechanism, configured to rotate said rotatable element to a design position, such that said first variable opening has a substantially equal cross-sectional area as said first port and said second variable opening has a substantially equal cross-sectional area as said second port.

6. The integrated heat exchange and fluid control device of claim 1, wherein said at least one bypass conduit has a cross-sectional area substantially larger than a cross-sectional area of said heat exchange conduits.

7. The integrated heat exchange and fluid control device of claim 1, said outlet tank includes a partition therein substantially preventing mixture of the first fluid received from said bypass section and the first fluid received from said heat exchange section.

8. The integrated heat exchange and fluid control device of claim 1, wherein said bypass section is positioned along a top side of the heat exchange section.

9. The integrated heat exchange and fluid control device of claim 1, further including a torque member coupled with and configured to rotate said rotatable element, said torque member extending away from said inlet section.

10. An integrated heat exchange and fluid control device comprising:
an inlet section configured to receive a first fluid into said integrated heat exchange and fluid control device;
a heat exchange section in fluid communication with said inlet section and configured to receive a portion of the first fluid, said heat exchange section including a plurality of substantially parallel heat exchange conduits;

a bypass section in fluid communication with said inlet section and configured to receive a portion of the first fluid and to substantially prevent heat exchange between the first fluid located in said bypass section and a second fluid, said bypass section including:

at least one bypass conduit located proximal to and substantially parallel with said heat exchange conduits, and

at least one blocking shield connected to said bypass section and positioned so as to obstruct airflow across said bypass section; and

an outlet tank coupled to said heat exchange conduits and said bypass conduits and configured to receive the first fluid therefrom;

wherein said inlet section is configured to adjustably distribute the first fluid between said bypass section and said heat exchange section.

11. The integrated heat exchange and fluid control device of claim 10, wherein an airflow direction is defined as being substantially perpendicular to said heat exchange section and said bypass section, said blocking shield being oriented substantially perpendicular to said airflow direction.

12. The integrated heat exchange and fluid control device of claim 10, wherein said at least one blocking shield is moveably mounted with respect to said bypass section in order to control heat exchange between the first fluid located in said bypass section and a second fluid.

13. The integrated heat exchange and fluid control device of claim 12, wherein said at least one blocking shield is moveably mounted via a pivoting mechanism permitting said at least one blocking shield to pivotally move with respect to said bypass section.

14. The integrated heat exchange and fluid control device of claim 12, wherein said inlet section does not restrict flow of said first fluid into said bypass conduits.

15. The integrated heat exchange and fluid control device of claim 10, wherein said outlet tank including a partition therein substantially preventing mixing of the first fluid received from said bypass section and the first fluid received from said heat exchange section.

16. An engine cooling system for a motor vehicle, comprising:
a pump;
an engine having coolant passages in fluid communication with said pump;
and
an integrated radiator and coolant control device in fluid communication with both said engine and said pumps and including:
an inlet section configured to receive liquid coolant into said integrated heat exchange and fluid control device;
a heat exchange section having a plurality of substantially parallel heat exchange conduits in fluid communication with said inlet section and

configured to receive said liquid coolant therefrom and to permit substantial heat exchange between said liquid coolant located therein and an airflow defined across said heat exchange section;

a bypass section having at least one bypass conduit in fluid communication with said inlet section and configured to receive said liquid coolant therefrom and to substantially prevent heat exchange between said liquid coolant located in said bypass section and said airflow; and said bypass section is positioned parallel with said heat exchange conduits and located proximal to the top face or the bottom face;

an outlet section coupled to said heat exchange section and said bypass section configured to receive said liquid coolant therefrom.